

## Pipe Rehabilitation CASE STUDY

# South San Joaquin Irrigation District (SSJID)- District Wide Pipeline Rehabilitation Program

Central Valley, California

### IMPLEMENTATION:

#### Equipment and Process:

- Utilized a **shotlining** mixer /pump combo for 1,000-pound bags of proprietary shotlining culvert mix.
- Applied the mixture through 300 feet of 1.50" diameter concrete hose to nozzle attached to Centrifugal Pipelining Machine (CPM) on a sled.
- The nozzle attached to the CPM, spinning at rapid speed, sprayed the material at 5000 psi onto pipe walls at a consistent ½" to ¾" thickness, covering holes and cracks – essentially forming a new pipe within the old pipe.
- Controlled application thickness (½" to ¾") by adjusting winch speed based on pipe size.

#### Crew and Production:

- Operated with a nine-man crew.
- Achieved a production rate of 250-400 linear feet per day.

#### Quality Control:

- Conducted regular material testing to ensure consistency and strength.
- Compression tests showed high strength results, with 28-day strengths averaging 7,162 psi.

### BACKGROUND:

The South San Joaquin Irrigation District (SSJID) faces significant challenges, particularly in its extensive network of underground pipelines. Many of these pipelines ranging from 30" to 48" in diameter, installed in the 1960s, are at the limit of their life expectancy, potentially compromising water delivery efficiency and reliability

### CHALLENGE:

SSJID needs to rehabilitate approximately 263 miles of buried cast-in-place concrete pipe (CIPP) over the next 50 years. The district is aiming to line about 75% of this pipeline network, equating to roughly 20,830 linear feet per year. This ambitious goal requires an efficient, cost-effective solution that could be implemented with minimal disruption to operations.



### SOLUTION:

*In 2022, SSJID adopted an innovative centrifugal pipelining technique using a specialized shotlining blend and specific equipment. This method allowed for trenchless rehabilitation of the aging pipelines, offering a non-invasive and very cost-efficient solution.*

## KEY RESULTS

### Production Increase:

- **2022/2023 season:**  
3,550 linear feet rehabilitated.
- **2023/2024 season:**  
6,348 linear feet rehabilitated, showing improvement.
- **2024/2025 season:**  
up to 10,000 linear feet planned

### Challenges / Lessons Learned:

- **Weather Impact:** Rain delays affected production and increased rental equipment costs.
- **Equipment Issues:** Experienced downtime due to concrete pump repairs. Backup units are important to avoid downtime
- **Material Consistency:** Encountered issues with some hardened material, highlighting the need for proper storage.

### Future Recommendations:

- Implement a separate preparation & cleaning crew to support the main pipelining crew.
- Aim for two 200-linear-foot pulls in each direction daily to increase production to 400ft/day.
- Purchase additional equipment, including a second concrete pump, to maintain production during any repairs.
- Improved material storage for consistent quality.



Proprietary shotlining mix



Proprietary Shotlining equipment

## Cost Effectiveness:

- Average cost: \$96.60 per linear foot
- While slightly over budget, this method proved much more cost-effective than full pipeline replacement at 6-8 times more. This Shotlining method cost 10-15% of pipe replacement cost and allows for the consideration of the complete project.

## Efficiency Improvements:

- Labor efficiency improved from 0.91 man-hours per linear foot in 2022/2023 to 0.81 in 2023/2024.

## Material Performance:

- Shotlining material demonstrated high strength, with 28-day cure strengths averaging 7,162 psi – goal was over 6,000 – 8,000 psi
- Material yield was 10% over theoretical, indicating efficient use of resources.

## Conclusion:

The SSJID program demonstrates the effectiveness of innovative shotlining techniques in addressing infrastructure challenges. Despite some hurdles, the project showed significant improvements in efficiency and production from its first to second year. This case study highlights the significant potential of trenchless rehabilitation methods in providing cost-effective, long-term solutions for irrigation districts facing similar infrastructure challenges.

**Innovative Shotlining Inc.**

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*“Shotlining has proven to be a very cost-effective alternative to pipe replacement”  
Chad Parsons PE, SSJID*